

# A PICTURE IS WORTH A THOUSAND LIVES

By Dr. JoAnne Castagna

We've all seen the images of Hurricane Katrina's destruction—flooded streets, destroyed homes, shattered families. It's these same images that are helping rebuild the lives of our fellow Americans in the Gulf Coast.

More than 1,600 United States Army Corps of Engineers (USACE) employees are supporting the Federal Emergency Management Agency (FEMA) and other state, federal, and volunteer agencies in the recovery efforts throughout Mississippi and Louisiana (see Figure 1). But before the recovery efforts could begin, the region needed to be mapped out. The hurricane had blown away most of the street signs, so rescue and recovery teams had no idea what streets they were on.

USACE uses a geographic information system (GIS)—a computer-based information system and analytical tool—to create the necessary maps. According to one of the three USACE action officers who are responsible for deploying and managing GIS teams throughout the disaster region, the GIS takes data from various sources—including aerial

photography, flood zones, and demographic data—and combines these layers of information in various ways as overlays to perform spatial analysis and produce a map that depicts the results of that analysis.

USACE uses GIS images in performing the following recovery efforts:

- **Assessing post-disaster damage.** To assess damage, maps are created of the entire region. First, aerial photos are taken of the region and then are laid over geographic coordinates. This information is brought into a computer mapping system to create a map.
- **Rescuing and recovering.** The GIS teams gather data on where hurricane victims are located and feed this information into the GIS database. This data is combined with the aerial photography and other geographic data to produce maps that search-and-rescue workers can use to locate and recover stranded individuals.
- **Building temporary homes.** Temporary housing is only allowed to be developed on land that is not prone to

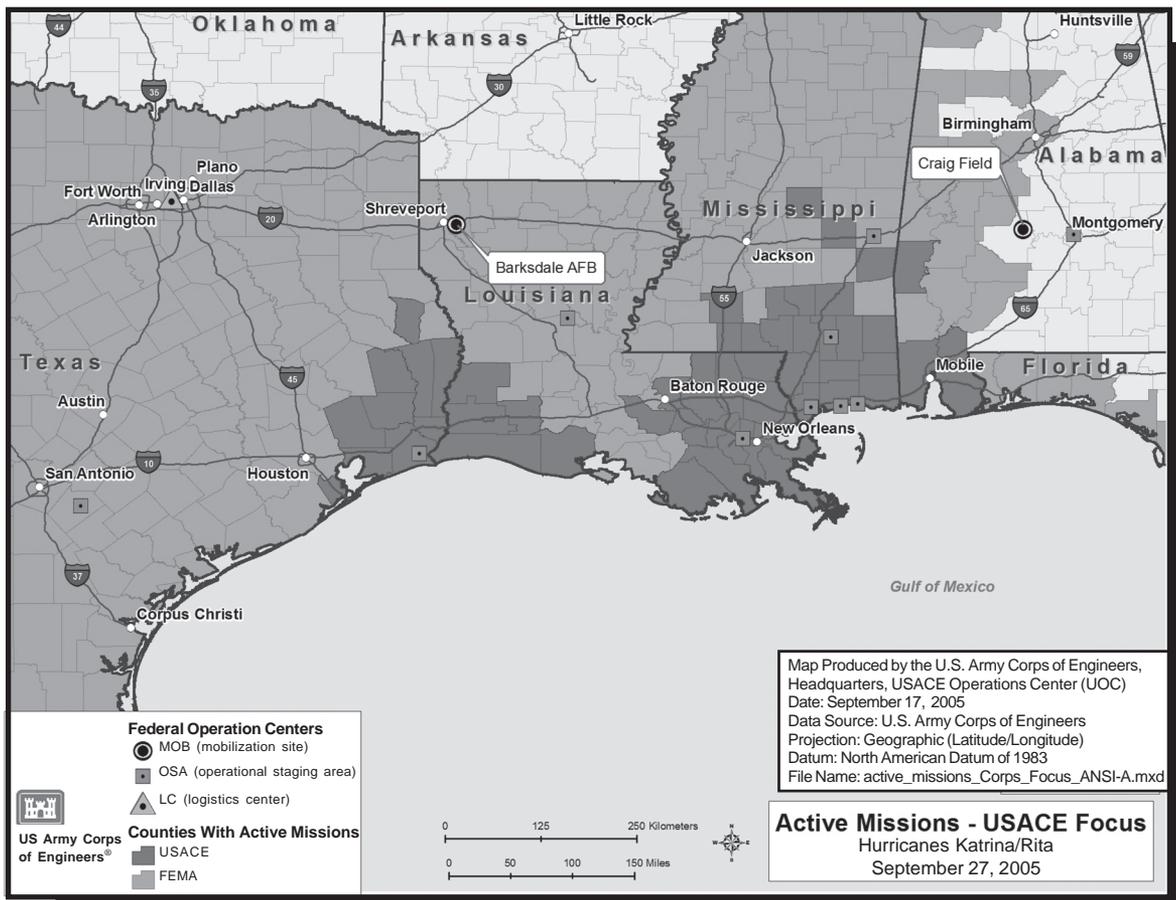


Figure 1. Active Missions

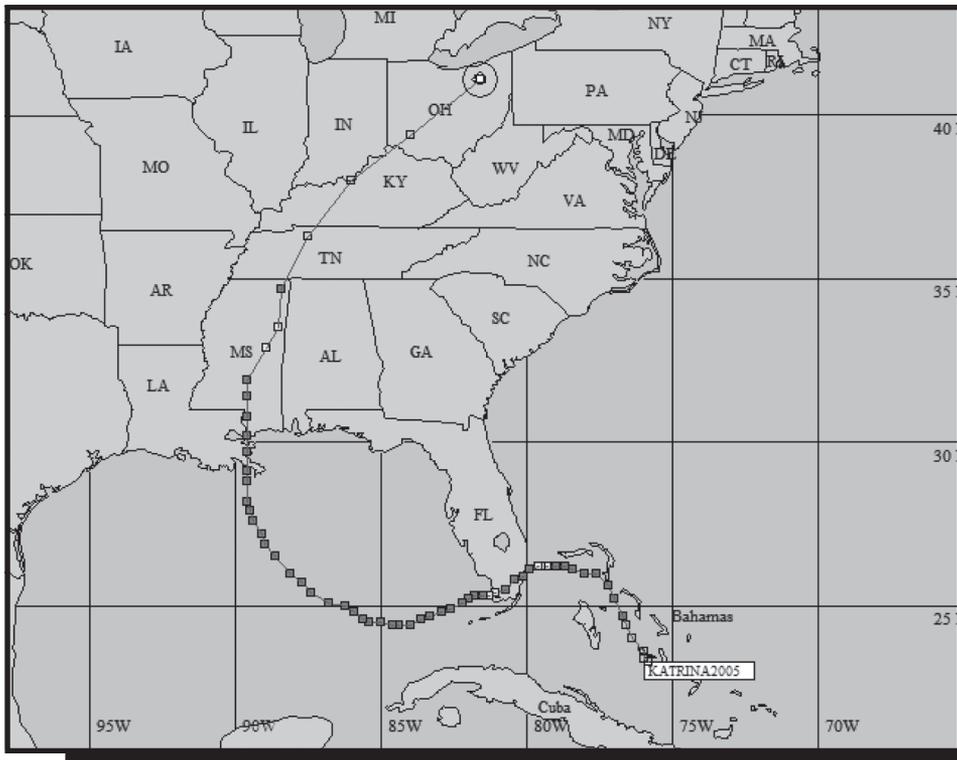


Figure 2. Katrina's Path

flooding, is safe, and is in the proximity of services such as hospitals and schools. Data on the flood zones is combined with other data types to produce maps that show the best locations for temporary housing.

- **Removing debris.** The GIS maps show engineers where debris is located. Engineers can calculate how much debris there is from these maps and determine how much it would cost to remove it. These maps also show where the land is clear. Clear land is needed for “staging areas” to hold the equipment that will be used to remove the debris. In addition, GIS maps show engineers the optimal routes for removing and transporting the debris.
- **Pumping floodwater.** The GIS can perform three-dimensional (3-D) analysis and modeling that shows how long it will take for floodwaters to subside, using different rates of pumping. In addition, GIS teams in the field can provide data about where pump stations are located and which ones are working and not working. This data was used to help calculate how long it would take to pump water out of the region.
- **Identifying impacted communities.** The GIS can be used to create demographic maps that identify what economic and racial groups are impacted the most. These maps are created by combining hurricane path data with the aerial images, wind speed data, and census data (see Figure 2). These maps are used by various groups involved in the rescue-and-recovery efforts, including the American Red Cross.

GIS mapping is one of several tasks that must be initiated immediately when acting on a disaster relief situation. Communicate, coordinate, and cooperate are the three essential

Cs for getting things going and accomplishing what is needed in a short amount of time in disaster situations. Following are suggestions for engineers who are faced with initiating a disaster relief mission:

- **Plan ahead.** Have a strategy in place before a disaster occurs.
- **Create a team of diversified specialists.** Many of the GIS team members are non-GIS specialists who come from other disciplines. These other additional skills can combine to meet the many needs during a disaster.
- **Organize and utilize available resources.** USACE needed to take aerial photography of the disaster and was able to immediately call on a contractor to perform that work.
- **Keep lines of communication open.** USACE worked closely with other agencies, and the working relationship was great, due to their frequent communication. One GIS team leader had two teleconference meetings with FEMA and other federal and state agencies daily.

There are a variety of ways that the GIS can be used to help support disaster missions. A picture is worth a thousand words, and if that picture has a lot of useful information on it, people can relate to it.



*Dr. Castagna is a technical writer/editor for the United States Army Corps of Engineers, New York District. She writes about the district's diversified civil and military projects and studies and has been published in more than 50 national and international publications. In 2004, her writing received accolades from the Department of the Army.*